

JUMO LMD⁹⁶
and **LMD⁴⁰⁰**

**Channel indicator and
monitoring unit**

**B 70.0202
Operating Instructions**

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1 Instrument functions

An LMD monitoring system consists of an LMD as the display/control unit and mTRON analogue input modules. It is possible to cover up to 400 channels and monitor them against limit values.

The measurements are shown in three red 4-digit, 7-segment displays, 13 mm high. In normal display, the corresponding channel number is indicated next to the measured value of a channel. The 3 or 4 relays and 4 LEDs available in the LMD serve to initiate alarms and signal various system conditions. The cyclic display can be held on any channel. The measurements can then be manually scrolled by operating the up or down keys. The assignment of the analogue input modules to the channel numbers takes place at the installation stage.

The outstanding features of the system are the simple commissioning of a complete installation, and the convenient configuration and parameter setting. The three red 4-digit, 7-segment displays and four LEDs give the operator a fast and complete overview of the installation.

Data exchange between the modules takes place via the LON bus.

1.1 Ordering details

Basic type (1) (2) (3) (4)
7002 02 / . - .. - 23

(1) Basic type

Type	Code
LMD 96/400	02

(2) Basic type extensions

Channels	Code
96 channels	1
400 channels	2

(3) Outputs

Relay and analogue output	Code
3 relays in the LMD-96	03
4 relays in the LMD-400	04

(4) Supply

Rear	Code
110 – 240V AC +10/-15%, 48 – 63Hz	23

1 Instrument functions

1.2 Functions of the LMD-96

- acquisition and display of 96 channels via **4-channel analogue input modules**
- monitoring of all channels against two adjustable limit values (alarm and prealarm), as well as for probe break.
- alarm generation if set limit values are infringed
- display of alarms and signalling via 3 relays and 4 LEDs
- acknowledge function
- simple installation
- three red 4-digit, 7-segment displays, 13mm high
- JUMO mTRON-iTOOL required for setting the parameters for the measurement inputs

1 — 24 4-channel analogue input modules

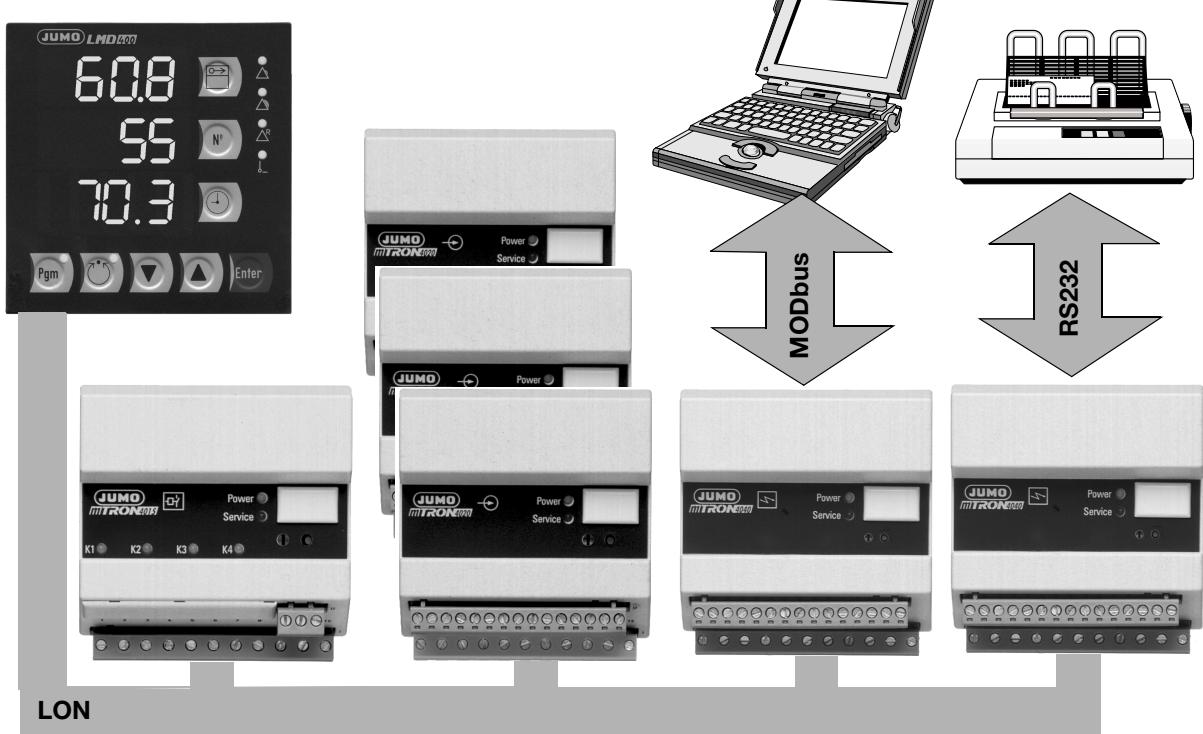
LMD-96: 96 channels max.



1.3 Functions of the LMD-400

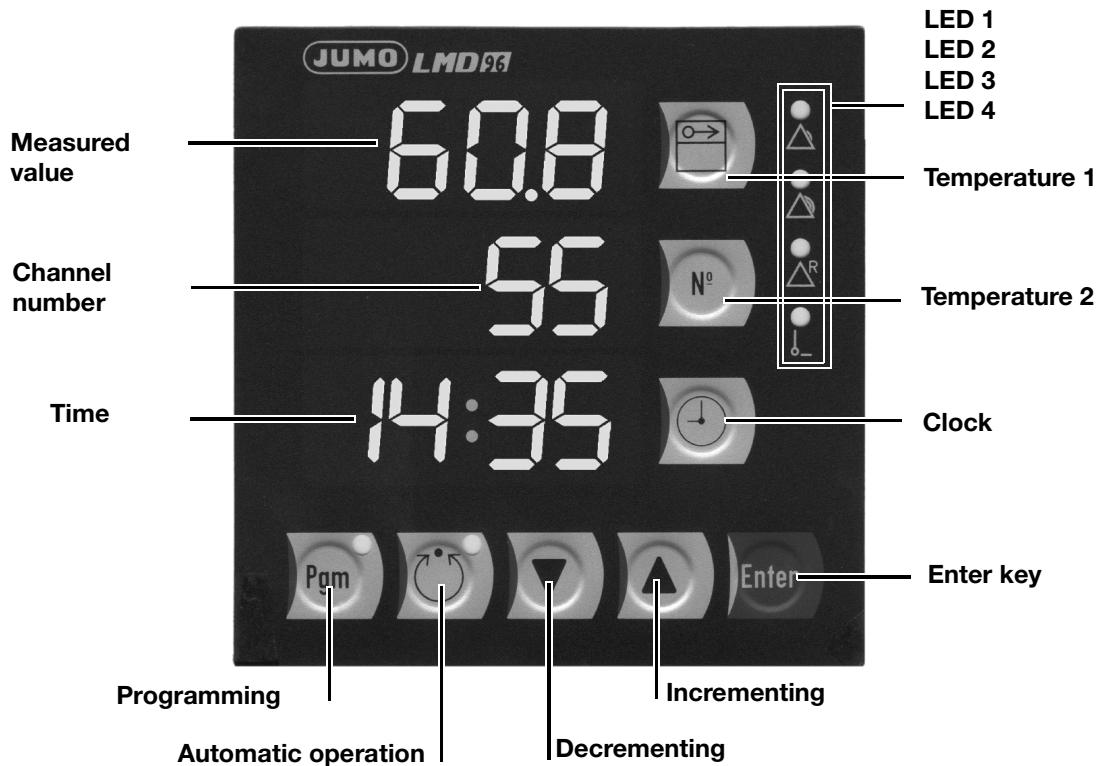
- acquisition of 400 channels via **4- and 8-channel analogue input modules**
- monitoring of limit values with window function
- separately adjustable limit values for each channel
- acknowledge function
- simple installation without additional tools
- three red 4-digit, 7-segment displays, 13mm high
- printer connection via communication module to report alarm occurrences and their acknowledgement (bus address: 111)
- daily journal print-out of all measured values at a specific time
- signalling of system conditions via 4 relays and 4 LEDs
- linking to SVS-2000 process visualisation software via communication module (bus address: 112)
- complete parameter setting of the analogue inputs
- masking out of individual channels possible
- additional relay output on mTRON relay modules possible (bus address: 110)

LMD-400: 400 channels max.
(e.g. 50 x 8 channel analogue input modules)



1 Instrument functions

2.1 Displays and controls



	Normal display	Alarm display (immediately on alarm occurrence)	Probe break or module failure
Upper display	measured value (one fixed decimal place)	measured value (one fixed decimal place)	“----”
Middle display	channel no. (2-digit, no decimal point)	“A”/“P” and channel no. “A” = alarm, “P” = prealarm	channel no. (2-digit, no decimal point)
Lower display	current time (hh:mm)		

2.2 Normal display

After switch-on the display will automatically be in scroll mode.

The LED in the key lights up, i.e. the channel number and therefore also the displayed measurement change at 2 second intervals.

If the key is pressed, the instrument changes to manual mode. The LED goes dark and the required channel number can be set with the and keys. In both display modes, newly occurring alarms will be displayed immediately.



2 Operation of the LMD-96



As long as the number of channels contains the value "0" (when a new instrument is switched on), no measurements will be retrieved or displayed.
⇒ Section 2.5 "Entering alarm limits and number of channels"



When an installed system is switched on, it takes 20 seconds before valid measurements are available. During this time, the first two displays will be switched off.

2.3 Alarm display

The desired alarm functions are activated by entering a limit value in place of the "not programmed" entry ("----").

⇒ Section 2.5 "Entering alarm limits and number of channels"

All measurements are cyclically retrieved in turn and compared with the set limit values in the LMD-96. If an infringement is detected, the corresponding alarm is generated.

If an alarm occurs, it is displayed immediately. However, in the background, measurements are still cyclically retrieved and compared with limit values. Further alarms are stored.

As well as the alarm displays described above, the system conditions are displayed via 3 relays and 4 LEDs. **The 3 relays operate as break contacts (negative logic).**

	Basic position	Prealarm	Alarm	Probe break
Relay 1	active	inactive	active	active
Relay 2	active	active	inactive	active
Relay 3	active	active	toggle operation, whenever unacknowledged alarms are waiting	active
LED 1	off	on	off	off
LED 2	off	off	on	off
LED 3	off	off	flashes, whenever unacknowledged alarms are waiting	off
LED 4	off	off	off	on

A genuine alarm must always be acknowledged by , before relay K3 returns to the basic position. This is also the case if the alarm condition clears before it is acknowledged. The relays, and consequently the LEDs K1 and K2, are only in the alarm condition for as long as the alarm or prealarm is actually present. LED K4 indicates a probe break or bus interruption.

2.4 Setting the time

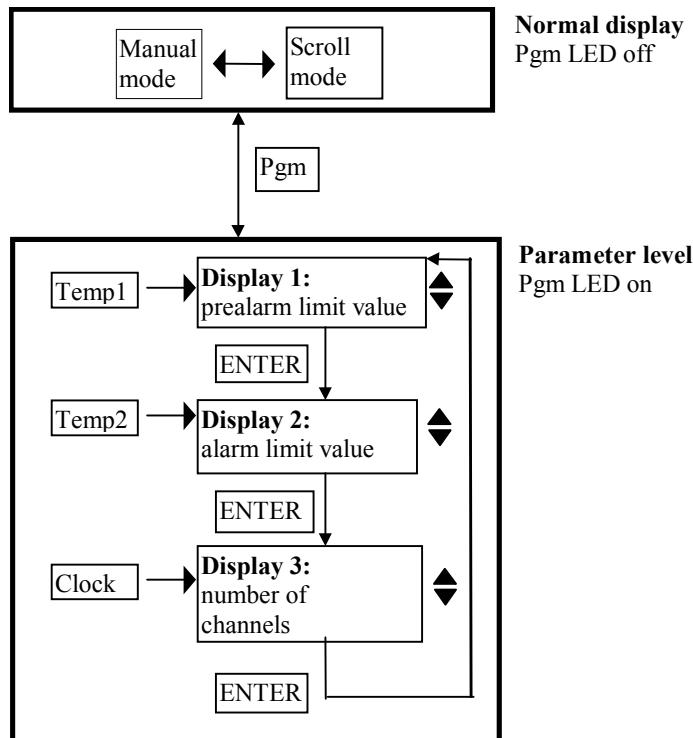
The time can be set in either manual or scroll mode. Input of the time can be ended at any time by pressing the clock key.

The instrument returns automatically to normal display.

- * Press the  key
- * Set the day (upper display) using the  and  keys
- * Confirm with 
- * Set the month (middle display) using the  and  keys
- * Confirm with 
- * Set the year (lower display) using the  and  keys
- * Confirm with 
- * Set the hours using the  and  keys
- * Confirm with 
- * Enter the minutes and set using the  and  keys
- * Confirm with 

2.5 Entering alarm limits and number of channels

- * Press the  key



- * Change the value which is currently flashing using the  and  keys

2 Operation of the LMD-96

Range of values:

- limit value for prealarm -250 to + 850°C (Temp1 key)
- limit value for alarm -250 to +850°C (Temp2 key)
- channel number 1 – 96 (Clock key)

* Confirm the entered value with **Enter**

* When all parameters are confirmed, leave the parameter level again, using the **Pgm** key.

2.6 Installation of a new system

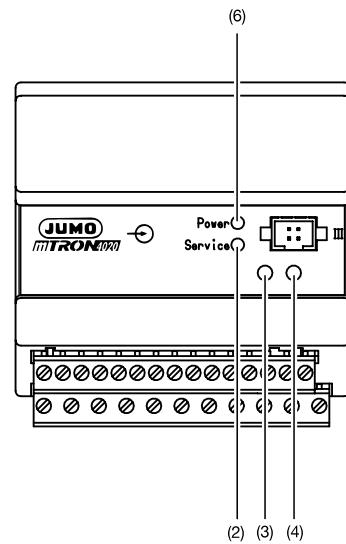
The installation can be completed without any additional aid.

* Wire up the modules in accordance with the connection diagram

The following installation procedure fixes the **module number and consequently the channel number** for all analogue input modules (module no. 1: channels 1 – 4, module no. 2: channels 5 – 8, etc...).

* Press **Pgm** + **▲**

("1" flashes in the middle display)



- * Press the installation key (4) on the module using a ball-pen or pencil.
After a successful installation, the value in the middle display increases.
- * Repeat the procedure until all modules are installed
- * End the installation with **Pgm** + **▲**
- * Adjust the number of channels

⇒ Section 2.5 "Entering alarm limits and number of channels"

2 Operation of the LMD-96

2.6.1 Extension of an installed system

- * Preselect a module number at the installation level using the  and  keys
- * Press the installation key (4) on the module using a ball-pen or pencil.
The module number which is set is assigned to this module. After a successful installation, the value in the middle display increases.



If a module number is duplicated when an installation is extended, this will lead to an incorrect measurement display, because the LMD-96 receives measurements from 2 different modules.

2.6.2 Replacing a faulty analogue input module

It is possible to exchange the Plug & Play memory, or to re-install the module.

⇒ Section 2.6.1 “Extension of an installed system”

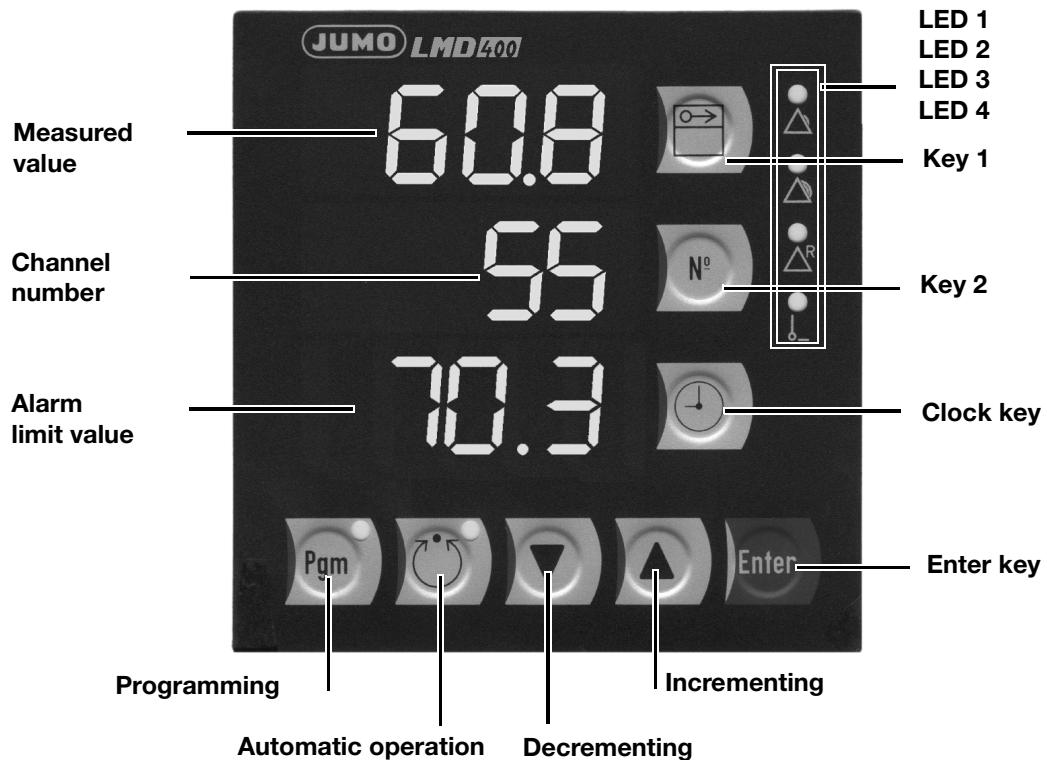
To replace the Plug & Play memory:

- * Switch off the supply
- * Remove the plug connectors and take out the module
- * Fit the Plug & Play memory of the faulty input module into the new module
- * Restore the connections by plugging in
- * Switch on the supply

2 Operation of the LMD-96

3 Operation of the LMD-400

3.1 Displays and controls



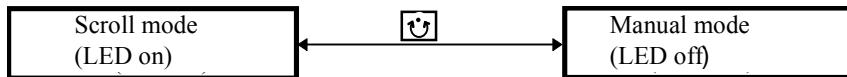
	Normal display	Alarm display (on alarm occurrence)	Probe break or module failure
Upper display	measured value (one decimal place)	measured value (one decimal place)	“----”
Middle display	channel no. (3-digit, no decimal point)	“A” = alarm (Cd 05=1) “P” = prealarm (Cd 05=1) “O” = overrange (Cd 05=0) “U” = underrange (Cd 05=0) and channel number	channel no. (3-digit, no decimal point)
Lower display	display of the alarm limit value (one decimal place) or [] key: the current time appears for 5 seconds		

3.2 Normal display

After switch-on, the display will automatically be in scroll mode (LED in the auto key lights up), i.e. the channel number, and therefore also the displayed measurement, change at the set scroll rate.
⇒ Section 3.11 “Configuration” Cd 02

3 Operation of the LMD-400

If the  key is pressed, the instrument changes to manual mode. The LED goes dark and the required channel number can be set with the  und  keys. In both display modes, newly occurring alarms will be displayed immediately.



 The number of channels is factory-set to “0”. Measurements will only be retrieved and displayed when this is changed to a different value.

 When an installed system is switched on, it takes 60 seconds before valid measurements are available. During this period the lower display will show the current time.

⇒ [Section 3.11 “Configuration”](#)

3.3 Alarm display

When an LMD-400 is installed, monitoring of the measurements against alarm limits takes place in the analogue input modules. However, the alarm limits as well as other parameters can be changed.

⇒ [Section 3.8.2 “Altering the module parameters”](#)

As well as the measurements, the alarm conditions of the input modules are retrieved in a cyclical sequence. If an alarm occurs, the LMD-400 automatically changes to the channel which has initiated the alarm. Further alarms are stored. In addition, the system conditions are displayed via 4 relays and 4 LEDs.

The 4 relays operate as break contacts (negative logic)

	Normal display	Lower limit underrange	Prealarm	Upper limit overrange	Probe break or bus interruption
Relay 1	active	inactive	inactive	active	active
Relay 2	active	active	active	inactive	active
Relay 3	active	switches on and off in time with the flashing pulses of the LED		switches on and off in time with the flashing pulses of the LED	
Relay 4	active	active	active	active	inactive
LED 1	off	on	on	off	off
LED 2	off	off	off	on	off
LED 3	off	flashes, whenever unacknowledged alarms are waiting	off	flashes, whenever unacknowledged alarms are waiting	off
LED 4	off	off	off	off	on

An alarm must always be acknowledged with  before relay 3 returns to the normal position. This is also the case if the alarm condition clears before it is acknowledged. The relays, and conse-

3 Operation of the LMD-400

quently the LEDs 1 and 2, are in the alarm condition only for as long as the alarm or prealarm is actually present. LED 4 indicates a probe break or bus interruption.

3.4 Alarm print-out

A communication module must be available for an alarm print-out. The data are transmitted via the **RS232 serial interface** to an ASCII printer, using only the RxD, TxD and GND lines (no handshake). For this reason, a sufficiently large backup memory must be available in the printer, or a lower baud rate must be set.

The alarm print-out with all alarms which have occurred takes the following format:

Date	Time	Channel no.	Alarm status	current measured value
dd.mm.yy	hh:mm	XXX	Alarm = alarm Pre = prealarm UUUUU = underrange OOOOO = overrange ACK = acknowledge Range = probe break Bus = module not replying	YYY.Y

Example:

01.03.1999 15:15 27 Alarm 45.0

3.5 Report print-out

The date and time are printed on the first line, then 8 channels are printed in a line. Current alarm values are shown in brackets. “noinp” means that the channel is switched off (no sensor).

Example for 12 channels:

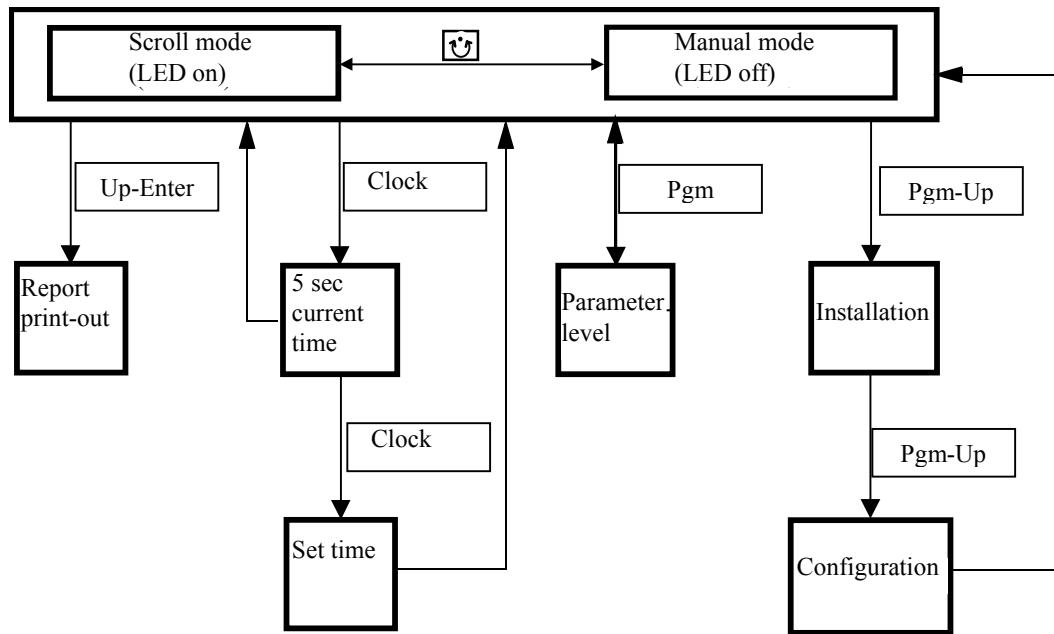
13.03.1999 10:55
001...008 27.0 23.5 66.3 48.9 66.3 (33.6) 66.3 12.5
009...012 22.0 21.3 noinp 55.9

The report print-out can be initiated either manually via the key combination + , or automatically at a programmable set time.

⇒ Section 3.11 “Configuration”

3 Operation of the LMD-400

3.6 Overview of functions



3.7 Setting the time

The time can be set in either manual or scroll mode. Input of the time can be ended at any time by pressing the clock key.

The instrument returns automatically to normal display.

- * Press the clock key twice
- * Set the day (upper display) using the \uparrow and \downarrow keys
- * Confirm with
- * Set the month (middle display) using the \uparrow and \downarrow keys
- * Confirm with
- * Set the year (lower display) using the \uparrow and \downarrow keys
- * Confirm with
- * Set the hours using the \uparrow and \downarrow keys
- * Confirm with
- * Enter the minutes and set using the \uparrow and \downarrow keys
- * Confirm with

3 Operation of the LMD-400

3.8 Configuring the channels

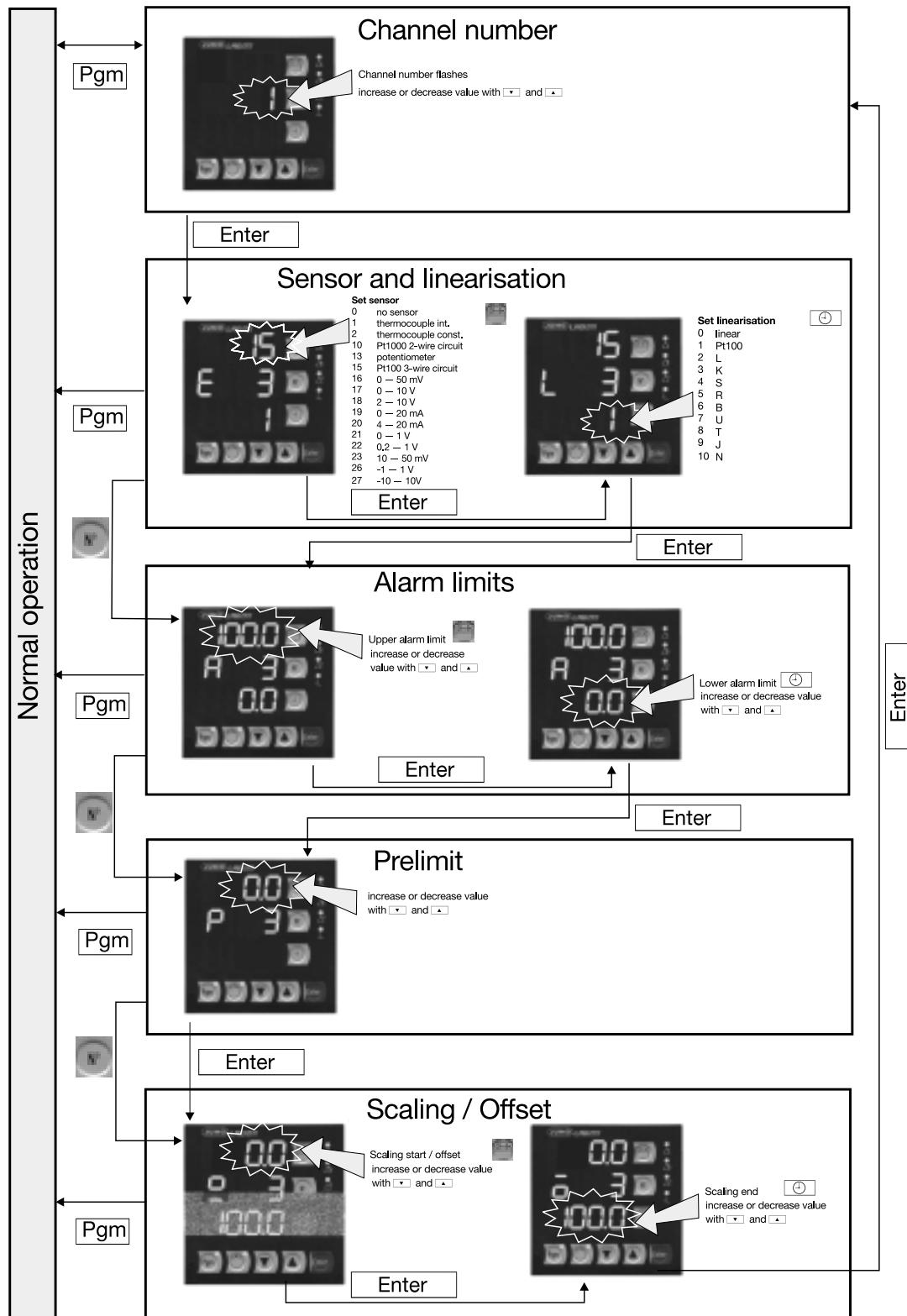
3.8.1 Factory settings

	Analogue input module, 4-channel	Analogue input module, 8-channel
Sensor	0 – 400 Ω	according to version
Linearisation	Pt100	Pt100
Scaling start	0	0
Scaling end	100	100
Lower limit	0	-50
Upper limit	100	+50
Prealarm limit	0	0

3 Operation of the LMD-400

3.8.2 Altering the module parameters

All table settings in the connected analogue input modules can be altered with the LMD-400.



3 Operation of the LMD-400

3.9 Installation of a new system

No further aids are required for the installation.

Altogether up to 400 channels of analogue input modules can be covered, and in addition 1 relay module and 2 communication modules can be connected.

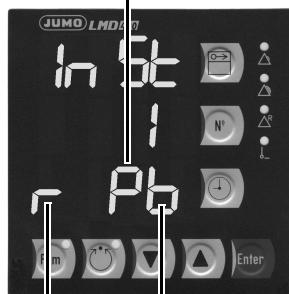
* Wire up the modules according to the connection diagram

The following installation procedure fixes the **module number and consequently the channel number** for all analogue input modules (module no. 1: channels 1 – 4, module no. 2: channels 5 – 8, etc...).

* Press **Pgm** + **▲**

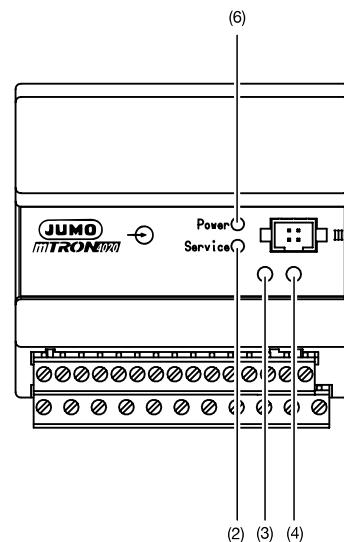
("1" flashes in the middle display)

appears after key (4) on the first communication module was pressed for the printer connection.
Address: 111



appears after key (4) on the second communication module was pressed for the supervisory level.
Address: 112

appears after key (4) on the relay module was pressed.
Address: 110



* Press the installation key (4) on the module with a ball-pen or pencil

The middle display is counted up, if an analogue input module was installed.

The lower display will show an r, P or b, depending on the type of module which is currently installed.

* When all connected modules have been identified, end the installation with **Pgm** + **▲**

* Adjust the number of channels

⇒ Section 3.11 "Configuration"



If only one communication module is to be used as the MODbus interface for the supervisory level, Cd14 must be reset to MODbus protocol at the configuration level. Instead of the "P" for printer, a "b" is then displayed during the installation.

3 Operation of the LMD-400

3.9.1 Extension of an installed system

- * Preselect a module number in the installation level using the  and  keys
- * Press the installation key (4) on the module with a ball-pen or pencil
The module number set is assigned to this module. After a successful installation, the value in the middle display increases.



If a module number is duplicated when a system is extended, this will lead to an incorrect measurement display, because the LMD-400 receives measurements from 2 different modules.

3.9.2 Replacing a faulty analogue input module

It is possible to exchange the Plug & Play memory or to re-install the module.

⇒ Section 3.9.1 “Extension of an installed system”

To replace the Plug & Play memory:

- * Switch off the supply
- * Remove the plug connector and take out the module
- * Fit the Plug & Play memory of the faulty input module into the new module
- * Restore the connections by plugging in
- * Switch on the supply

3.10 De-installation

If any previously installed communication modules or the relay module are no longer required, they can be taken out of the system again.

- * Press **Pgm** and **▲**
- * Press the **○** key repeatedly, until the module letter to be removed flashes
- * Press **Enter**
The module letter disappears from the display and is consequently removed from the system.
- * Remove further modules with **○** and **Enter**, if required

 The N° key takes you back to the installation level.
⇒ Section 3.9 “Installation of a new system”

- * End the de-installation with **Pgm** and **▲**

 The configuration level is accessed automatically.

3 Operation of the LMD-400

3.11 Configuration

The Cd functions are used to adapt the particular module to the specific application.

It is possible to leave the configuration level at any time with the **Pgm** + **▲** keys.

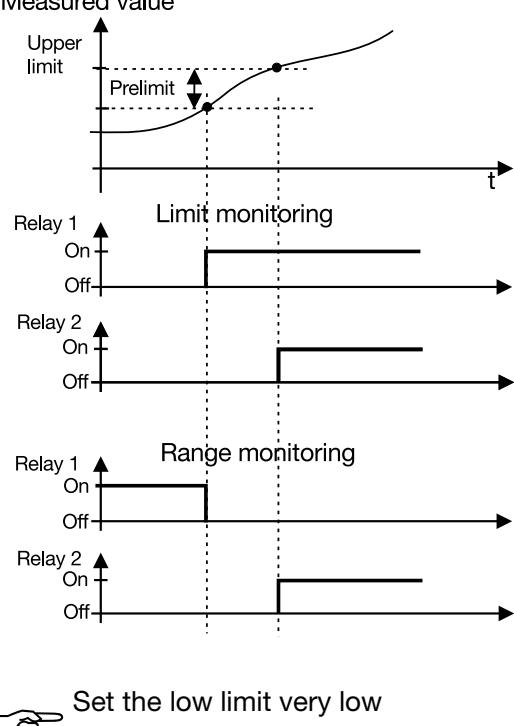
All entries acknowledged with **Enter** are stored automatically.

⇒ Section 3.6 “Overview of functions”

* Enter the password and acknowledge with **Enter**

* Select the required Cd function using the **▲** and **▼** keys and acknowledge with **Enter**

* Set the required value and acknowledge with **Enter**

Code	Meaning	Value range	Factory setting
Cd 1	display of software version	-	-
Cd 2	scroll time for channel switching	1 – 60 sec	2
Cd 3	time of daily report print-out 0000 means no print-out	00:01 – 23:59	0000
Cd 4	number of channels	1 – 400	0
Cd 5	Measured value  Relay 1 On Off Relay 2 On Off Relay 1 On Off Relay 2 On Off Set the low limit very low	0 = range monitoring 1 = limit monitoring	1
Cd 6	upper limit for all channels ---: different upper limit for all channels	-199.0 to +850.0	---
Cd 7	lower limit for all channels ---: different lower limit for all channels	-199.0 to +850.0	---

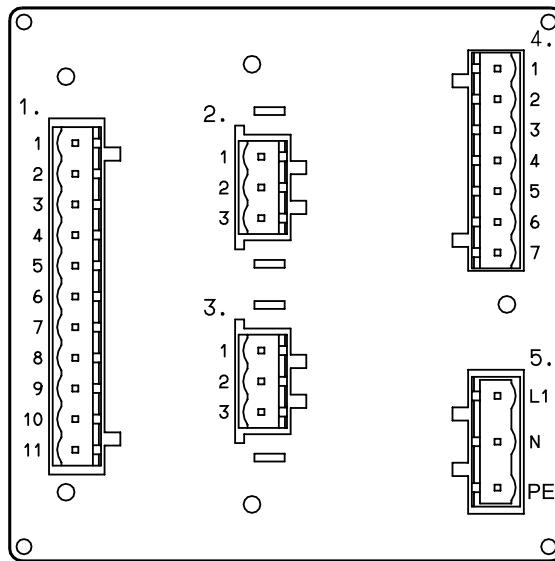
3 Operation of the LMD-400

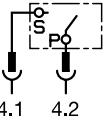
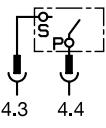
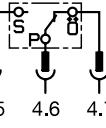
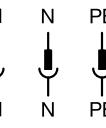
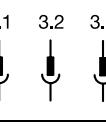
Cd 8	differential for prealarm ---: value is to be entered for each channel	-199.0 to +850.0	---
Cd 9	with "linear" linearisation, this is the display value for start of the standard signal range with all other linearisations: offset for all channels ---: value is to be entered for each channel	-199.0 to +850.0	---
Cd 10	display value for end of the standard signal/ resistance thermometer range --: value is to be entered for each channel	-199.0 to +850.0	---
Cd 11	password setting	0 — 99	0
Cd 12	baud rate	2 = 1200 3 = 2400 4 = 4800 5 = 9600 6 = 19200 7 = 38400	5
Cd 13	parity	0 = none 1 = even 2 = odd	0
Cd 14	switching between printer operation or MODbus protocol for supervisory level	0 = printer operation 1 = MODbus	-

* End the configuration with **Pgm** + 

3 Operation of the LMD-400

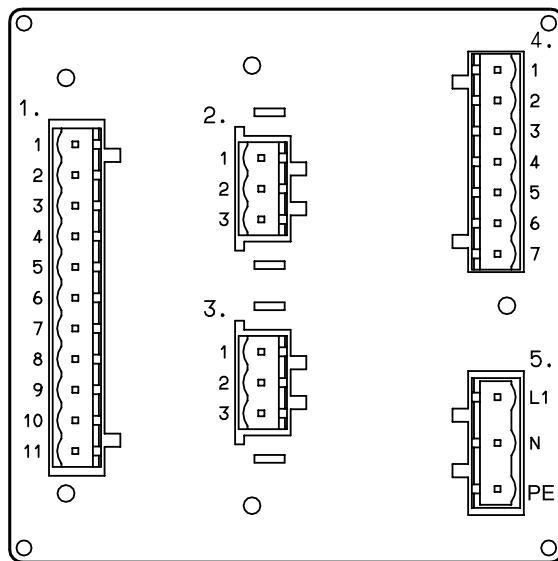
4.1 Connection diagram LMD-96



Relay outputs 1 – 3	Terminals, connector 4		
Relay 1	4.1 n.o. (make) 4.2 common	Contact protection: varistor S14K300 Contact life: 10 ⁶ operations at rated load contact rating: 230V 3A (resistive load)	
Relay 2	4.3 n.o. (make) 4.4 common		
Relay 3 (changeover contact)	4.5 n.o. (make) 4.6 common 4.7 n.c. (break)		
Supply	Terminals, connector 5		
110 – 240V AC +10/-15%, 48 – 63 Hz	L1 N PE	line neutral protective earth	
LON interface	Terminals, connector 3		
FTT 10A 78kbaud	3.1 3.2 3.3	technical earth screened twisted pair screened twisted pair	

4 Electrical connections

4.2 Connection diagram LMD-400



Relay outputs 1 – 4	Terminals, connectors 4 and 2		
Relay 1	4.1 n.o. (make) 4.2 common	Contact protection: varistor S14K300 Contact life: 10 ⁶ operations at rated load contact rating: 230V 3A (resistive load)	
Relay 2	4.3 n.o. (make) 4.4 common		
Relay 3 (changeover contact)	4.5 n.o. (make) 4.6 common 4.7 n.c. (break)		
Relay 4 (changeover contact)	2.1 n.o. (make) 2.2 common 2.3 n.c. (break)		
Supply	Terminals, connector 5		
110 – 240 V AC, +10/-15%, 48 – 63 Hz	L1 N PE	line neutral protective earth	
LON interface	Terminals, connector 3		
FTT 10A 78kbaud	3.1 3.2 3.3	technical earth screened twisted pair screened twisted pair	

4 Electrical connections

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